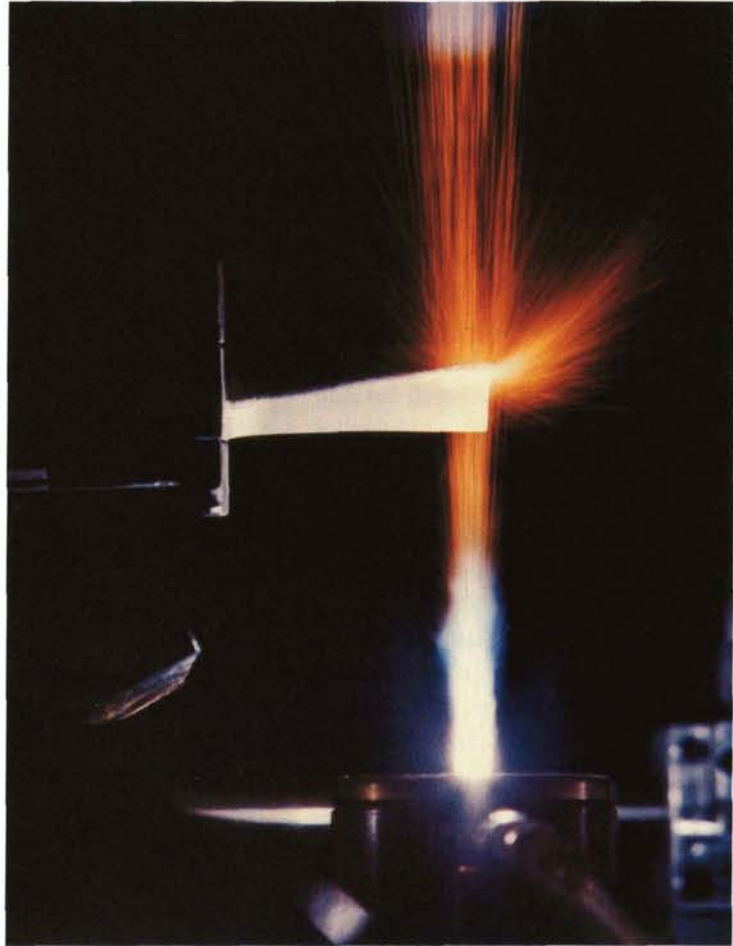


In the early 1980s, the Materials and Manufacturing Center (MMTC) of TRW Inc., which has since become MMTC/Textron, Cleveland, Ohio, conducted a research program for Lewis Research Center involving use of "thermal barrier" coatings to improve aircraft engine efficiency and reduce fuel consumption. The coatings, applied to turbine blades, combustors and other engine parts, allowed increasing the operating temperature of an engine by several hundred degrees, thus increasing overall efficiency.

For applying the coatings, MMTC invented a computer-aided, fully automatic robotic system for spraying a very hot plasma onto a turbine blade (right). MMTC also found it necessary to develop a means of controlling the thickness of the plasma deposit, which is measured in thousandths of an inch. This led to development of advanced optical gaging techniques to monitor and control point-to-point plasma spray deposition buildup on the surfaces of turbine blades.

These optical gaging techniques became the basis for a family of computerized optical gages built by MMTC for inspecting aircraft or industrial turbine and compressor blades, vanes and other parts of complex shape. MMTC/Textron offers 10 standard commercial robotic gages, including the Textron Model 501B shown at far right; it is in production use for in-process and final inspection of compressor blades and vanes. In addition to measuring and analyzing the airfoils in three dimensions, the system generates two dimensional profiles for assessing the status of—and specifying repairs to—the electrochemical machining cathodes used to make the parts. The Model 501B, and other similar systems, are capable of production floor accuracies to a ten-thousandth of an inch at speeds much faster than coordinate measuring machines.



MMTC/Textron is now marketing an expanded line of advanced optical gages for high precision, complex geometry applications on blades, vanes, integrally bladed rotors, impellers, integrally cast stators and other turbine parts. The gages employ laser, fiber optic or structured light video camera sensors as the application dictates. At lower right is one member of the new family, the Textron Model 6000.

These spinoff gages, says MMTC/Textron, not only offer multiple improvements in controlling the quality of manufactured parts, they also provide significant savings in the overall cost of the manufacturing process.

